



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/981,402	10/17/2001	Yoshihiro Satoh	N32040200W	6789

7590

06/02/2004

Darryl G. Walker
WALKER & SAKO, LLP
Suite 235
300 South First Street
San Jose, CA 95113

EXAMINER

RICHARDS, N DREW

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 06/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/981,402

Applicant(s)

SATOH, YOSHIHIRO

Examiner

N. Drew Richards

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2004.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2 and 7-25 is/are pending in the application.
- 4a) Of the above claim(s) 7-20 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1, 2 and 25 is/are allowed.
- 6) ☒ Claim(s) 21-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 21 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakamura et al. (U.S. Patent No. 5,986,299).

Nakamura et al. disclose in figure 20 a semiconductor device including an insulating film formed from gas containing carbon comprising:

a contact 110 which penetrates a first interlayer insulating film 108 and is electrically connected with a diffusion layer 103 in the silicon substrate 101;

a capacitor contact 113,116 that is interposed between a lower electrode 119,120 of a memory cell capacitor 120,121,122 and the contact 110 while penetrating a second interlayer insulating film 112 and a third interlayer insulating film 115;

a conductor 114 which is formed on the second interlayer insulating film 112 and below at least a portion of the third interlayer insulating film 115, and contains a nitride film 142 at upper and side portions, the side portion nitride film in direct contact with the capacitor contact 113,116 and the conductor 114;

a fourth interlayer insulating film 118 which is formed on the third interlayer insulating film 115;

and a silicon nitride film 143 for preventing carbon diffusion having a portion sandwiched between the fourth interlayer insulating film 118 and the third interlayer insulating film 115 while traversing a region except a connection portion between the lower electrode 119 and the capacitor contact 113, 116 and is formed above the nitride film 142 at the upper portion of the conductor.

The silicon nitride film is considered to have two portions, the "upper" portion which includes the portion that is along the top of the conductor and the "side" portion which includes the portion that is along the side of the conductor and extends along the surface of the second interlayer insulating film 112.

With regard to claim 22, the insulating film is disclosed as tantalum oxide (column 3 lines 60-62) and the semiconductor device is a dynamic random access memory (DRAM, column 14 line 10) having a memory cell capacitor film including the tantalum oxide.

3. Claims 23 and 24 are rejected under 35 U.S.C. 102(a) as being anticipated by Applicant's admitted prior art.

Applicant's admitted prior art, hereafter referred to as "APA", discloses in figures 16-21 a semiconductor device.

With regard to claim 23, APA discloses a contact 30 that is electrically connected with a diffusion layer (not shown) formed in the silicon substrate while penetrating a first interlayer insulating film 26, the contact is electrically connected to a capacitor contact 46 that is interposed between a lower electrode of a memory cell capacitor (not shown)

Art Unit: 2815

and the contact 30 while penetrating a second interlayer insulating film 32 and a third interlayer insulating film 42 for providing an electrical connection between the lower electrode and the contact;

a conductor 33,34 which is formed on the second interlayer insulating film 32 and below at least a portion of the third interlayer insulating film 42, and that contains a nitride film 36,40 at upper and side portions; and

a silicon nitride film 36,40 for preventing carbon diffusion formed between the second and third interlayer insulating films while traversing a region except a connection portion between the lower electrode and the capacitor contact, and is formed on the nitride film at the upper and side portions of the conductor. Films 36 and 40 are each considered two separate nitride layers laminated on one another where the first layer (the lower portion of 36 and the inside portion of 40) is the nitride film on the conductor while the second layer (the upper portion of 36 and the outside portion of 40) is the silicon nitride film for preventing carbon diffusion.

With regard to claim 24, the insulating film is disclosed on page 3 lines 8 and 9 as including tantalum oxide (Ta_2O_5) and the device is disclosed as being a dynamic random access memory having a memory cell capacitor film including the tantalum oxide.

Allowable Subject Matter

4. Claims 1, 2 and 25 are allowed.

Response to Arguments

5. Applicant's arguments filed 3/9/04 have been fully considered but they are not persuasive.

With regard to claim 21 and 22, Applicant has argued that Nakamura's silicon nitride layer 142 is not in direct contact with the third plug. This is not persuasive as the side portion of layer 142 is considered to be the portion extending along the side of the conductor 142 and along the second interlayer insulating film. Thus, this "side" portion does contact the third plug 116.

With regard to claims 23 and 24, Applicant has argued that the background art (APA) does not show a conductor formed on a second interlayer insulating film and below at least a portion of a third interlayer insulating film. This is not persuasive as figure 16 clearly shows a conductor 33,34 on the second interlayer insulating film 32 and below a portion of the third interlayer insulator 42.

Applicant also argues that the interpretation of a single layer as multiple layers is in error as the figure clearly shows a single layer. This is not persuasive as a single silicon nitride film has the same structure as two silicon nitride films formed one on the other. In claims drawn towards the device it is the final structure claimed that determines patentability. When there is no structural difference between what is claimed and what is shown in the prior art, merely a difference in nomenclature (i.e. naming a layer as a single, double or triple layer of the same material), then there is no basis for patentability. In the case of the silicon nitride layers claimed, there is no structural difference between one layer or multiple layers so long as the final shape of

Art Unit: 2815

the layers is the same. If a deposition process for the silicon nitride was stopped and restarted multiple times it would result in the same structure as when the deposition process was continuous. Each time the process was stopped and restarted a "second" or "third" or subsequent layer would be formed, but the final structure would be the same as in the case where the process was run continually. Thus, interpreting the "single" layer shown as two nitride layer as claimed is considered a proper interpretation.

Conclusion

6: Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


Art Unit: 2815

Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Drew Richards whose telephone number is (571) 272-1736. The examiner can normally be reached on M-F 8:00-5:30; Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


NDR


GEORGE ECKERT
PRIMARY EXAMINER